Is market research any good? Yes, but beware...
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What recession? Sales for Japan's top 50 jumped 19%
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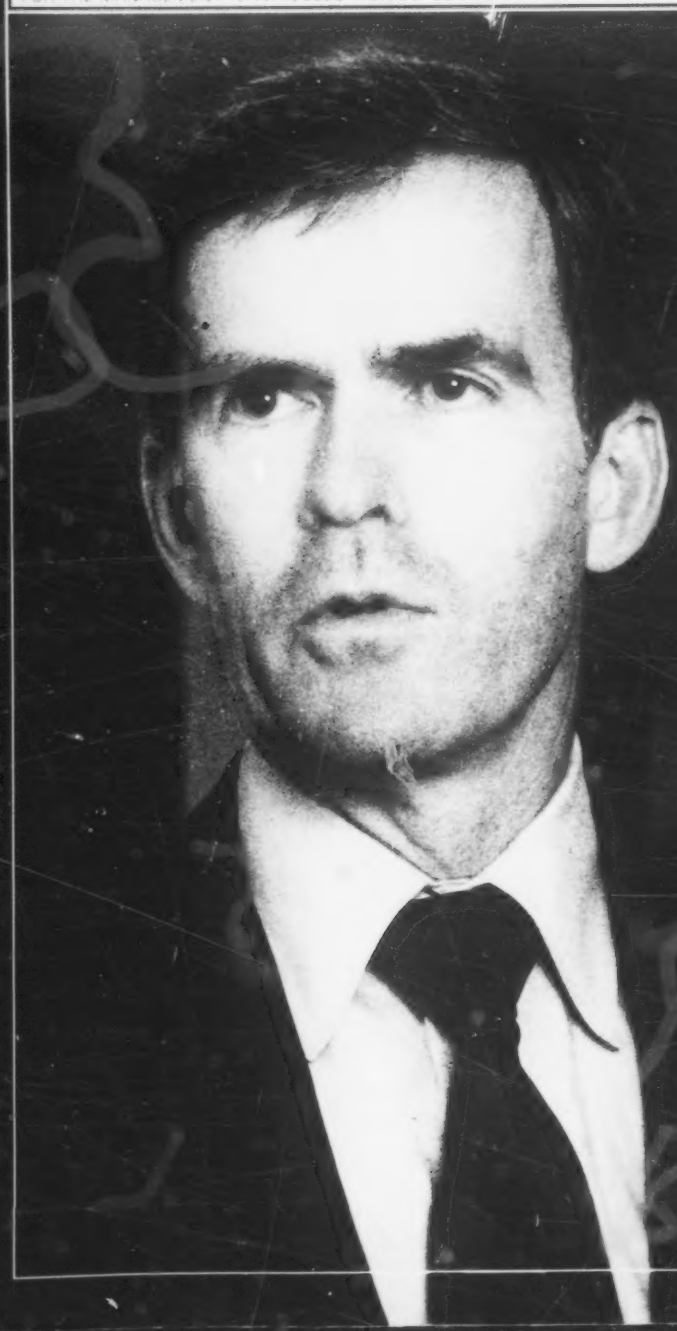
A CAHNERS PUBLICATION

Electronic Business

FOR THE MANAGEMENT TEAM IN ELECTRONICS, COMPUTER AND SYSTEMS COMPANIES WORLDWIDE SEPTEMBER 23 1991



WASHINGTON REPORT

★★★★★★★★★

After years of struggle, the U.S. inches toward a technology policy. Is that good?

PAGE 28

Sen. Jeff Bingaman (D-N. Mex.), author of the National Critical Technologies Act, calls for industry-government partnerships

Electronic Business

VOLUME 17, NUMBER 18 | FOR THE MANAGEMENT TEAM IN ELECTRONICS, COMPUTER, AND SYSTEMS COMPANIES WORLDWIDE | SEPTEMBER 23, 1991

Cover photo by Howard Davis

PAGE 28 "We need an alliance between government and industry," says Sen. Jeff Bingaman (D-N.Mex.)

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Even the devoutly laissez faire Bush Administration admits the U.S. doesn't get much bang for its R&D buck. Capitol Hill powerhouses want to create the nation's first true technology policy

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Making Washington a profit center

WILL THE notion of national technology policy ever become politically correct? If so, what should it look like? These are important questions for U.S. companies whose overseas competitors already benefit hugely from such policies. ELECTRONIC BUSINESS looks for answers with this issue's special report on Washington and electronics.

Managing editor Garrett DeYoung

Industrial policy has been anathema to the free-market idealogues of the last two administrations, but the bottom-line—as in tax-revenue—consequences of global competition are softening that stance. As managing editor Garrett DeYoung explains in the cover story, Congress and even the White House are now supporting some specific, low-cost proposals aimed at increasing U.S. electronics competitiveness.

It's easy to blame politicians and bureaucrats for the lack of a national technology policy. Easy and, to a large extent, accurate. But the electronics industry has to take some of the blame; it has worked hard to keep the federal government at arm's length. In fact, a Silicon Valley CEO confides that Washington looks like another planet from where he stands.

But that view is changing, reports West Coast managing editor Hugh Willett. As the political consciousness and involvement of Valley executives is expanding, the electronics lobby is growing as well, although it still has a lot to learn. Contributing editor Willie Schatz tackles that subject with a Washington insider's look at what it could cost your company if you decide to seek the help of an industry lobbyist—or the price you might pay if you don't.

If you choke at the fees of lobbyists, you probably also chafe at the cost of market research. How do you know if you are getting your money's worth? In this issue, senior editor Elizabeth Baatz researches the researchers, showing how well the leading research houses perform and how their customers are banding together to set some research ground rules.

Meanwhile, don't expect an effective national technology policy to resemble an electronics CEO's personal wish list. You won't find immediate help in the form of R&D tax credits or a tax break on capital gains. Look instead for education programs, ways to boost return-on-investment at government labs, and—above all—anything that helps balance the federal budget.

—Contributing editor John Parker

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companies. Schlumberger has reaped profit margins greater than 50%.

Why are these niches so important to the $250 million ATE division? For one, the machines have helped the company sell pricier testers to each of the top 10 Japanese IC makers. But Neil Richardson, vice president of the ATE division's diagnostic systems group, has a more personal crusade: "Everyone is always talking about how the ATE companies have to change their ways to survive. I'm intent on doing something about it."

Between the e-beam installed base and users of its new systems, Richardson expects focused ion-beam market to reach beyond $60 million by 1995. The analysts agree. "They've made some nice money in e-beams," says Ken Neff of Prime Data Inc. "If I were them I'd give it one more try."

—By Peter Burrows

SEMICONDUCTORS

Are start-ups poised for GaAs growth spurt?

FOREVER THE technology of tomorrow, gallium arsenide has begun shedding its image as an esoteric and pricey alternative to silicon. At least that's what advocates claim.

Growing demand for the high-speed ICs in certain computer and communications sectors will fuel the GaAs industry to a 39% compounded annual growth rate through 1995, estimates BIS Strategic Decisions.

While that growth is impressive, GaAs won't soon threaten the silicon market. 1990 worldwide sales of GaAs chips totaled just $142 million, says BIS, and 1995 sales will reach only $740 million. In 1990, worldwide merchant silicon chip sales were more than $50 billion.

So far, a few small U.S. companies have driven much of the GaAs development, and they will continue to be key players in the market, claims BIS consultant Richard Endersby.

Three of these small fry merged last May in hopes of cutting overhead while coincidently achieving greater market clout. They include TriQuint Semiconductor, GigaBit Logic, and Gazelle Microcircuits. The now expanded TriQuint claims to be the world's largest commercial GaAs manufacturer and it projects 1991 revenue of about $40 million, according to Louis Pengue, director of marketing communications.

Vitesse Semiconductor also seeks the GaAs throne. It had sales of $17.8 million in 1990, roughly equal to TriQuint's, and Bob Nunn, Vitesse's director of marketing, predicts revenue will double in '91.

Both Pengue and Nunn note their companies compete more with silicon vendors than with each other. For example, more than 50% of TriQuint's business is in the area of digital communications and signal processing while Vitesse produces densely integrated, low-power digital chips for computer applications.

The pioneering GaAs companies believe they have enough time to secure their market niches before the market attracts large manufacturers, such as Motorola, Texas Instruments, and several large Japanese and European chip makers that have active GaAs programs.

—Dwight B. Davis in Seattle

MARKETS

Color printer makers are mostly seeing red

THE BATTLE FOR market share among vendors of low-end color printers, particularly thermal-wax and ink-jet types, is prompting a pricing war that's slashing profits.

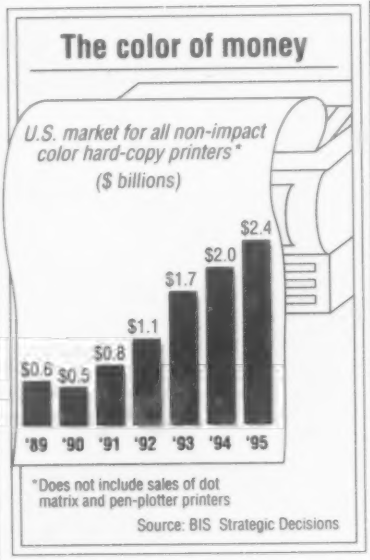
Thermal-wax printer combatants include Tektronix, Seiko, and QMS. Even ink-jet pricing from Hewlett-Packard Co. is falling. End users, of course, are ecstatic.

Prices for non-impact color printers have dropped on the average about 15% in the last six months, and in some segments it's been down 20%, according to Bill Flynn, market analyst, BIS Strategic Decisions.

Profit margin relief may come in the form of newer electro-photographic (E-P) or "true" laser technology which is expected to appear by 1993. E-P essentially affixes dry toner to a page using scattered beams representing different colors.

Flynn says there is only one U.S. vendor, Naples, Fla.-based Colorocs Corp., shipping a laser-emitting diode E-P printer. Others—HP, Canon, and Xerox among them—are expected to follow with introductions in the next year. BIS estimates revenue from sales of E-P printers will jump from $24 million in 1990 to $71 million this year, then climb to nearly $170 million by the end of 1992. By 1995 the firm expects sales of E-P printers to reach $900 million, nearly a third of the total revenue for all color printers.

"There'll be less than 30,000 shipped this year, but it will really start to take off next year," says Flynn, adding that he figures a



152.2% calculated annual revenue growth rate for E-P printer shipments through 1995. "E-P will be worth three times the market for thermal by then," he predicts.

—By Dave Webb in San Jose

MARKETING

Compaq ad suits reap PR benefit

COMPAQ COMPUTER is the latest entry into a field of high-tech companies that are using litigation to fight aggressive marketing campaigns by competitors. Some observers even argue the suits produce more PR than offending ads.

Compaq's beef is with several aggressive ad campaigns from Dell Computer, one of which calls its own PC a "Road Warrior" and compares it with Compaq's "Road Worrier." Compaq's fury spans two continents.

Compaq has filed suit against Dell because of its head-to-head advertising in the United Kingdom, the United States, and most recently, Germany.

Although aggressive comparison ads are proliferating, especially by direct-mail PC suppliers, the concept is still new to the computer industry, says David Versfelt, a lawyer with Donovan Leisure Newton & Irvine.

In the U.K., Dell has been enjoined from publishing ads comparing prices with Compaq's. In the United States, Compaq charges Dell's advertising is false and misleading.

In a more unusual move, Compaq also obtained an injunction against a Dell ad that ran in Germany. The ad, which touted Dell's position in a Datapro survey as "No. 1 in customer satisfaction Europe-wide," violated an obscure German rule requiring that a specific number of German citizens be polled in any survey that is quoted in German advertising.

The Compaq/Dell cases in Germany and the U.K. point out a problem that many marketers will run into as the European Community gels in 1992 and companies begin to advertise internationally. "Europeans have a much more narrow view of comparative advertising," says attorney Rick Kurnit, a partner with Frankfurt, Garbus, Klein & Selz. "Competitors have a better chance to enjoin ads there."

The lawsuits could do more for Compaq than just stop Dell from running ads. One school of thought holds that the plaintiff can get as much advertising value out of the lawsuit as the defendant gets out of the ad campaign. At the same time, Compaq could face a backlash. "That could be a valid concern," says Kurnit, "particularly if the company is spending more money on litigation than on product support."

—By Donna Tapellini in New York

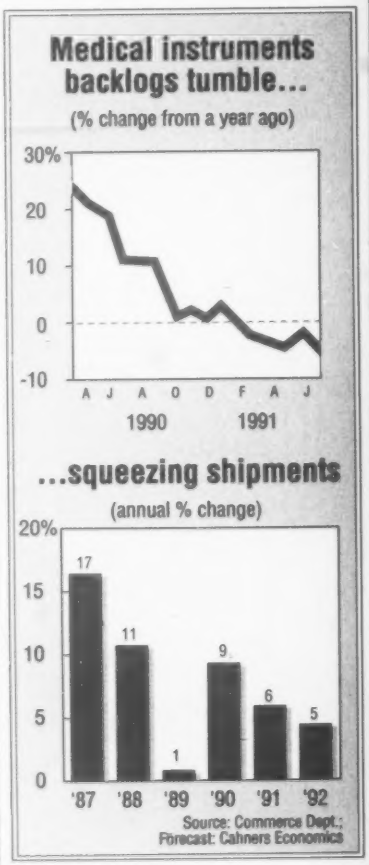
MEDICAL ELECTRONICS

Medical electronics not immune to recession

NOT SINCE THE recession of 1974 has the medical instruments industry been so hard hit by a downturn. Unfilled orders for the industry fell during each the first six months of 1991—the longest string of declining backlogs in 16 years, according to the U.S. Commerce Department. For managers more used to burgeoning backlogs, operational shifts to accommodate a slow growth forecast may be difficult.

Medical instruments, a cyclical industry, is used to wild gyrations in sales. Double-digit shipments growth one year often leads to weak sales the next. In the 1986 electronics industry recession, shipments growth slowed to a sluggish 2.2% without adjusting for inflation, followed by 16.5% growth in 1987. Shipments then slumped again to just 0.9% growth by 1989.

In this recession, hospitals are having a hard time making money and so are deferring capital spending. Physicians' demand for advanced instruments coupled with technological advances shielded electromedical equipment makers from the 1989 slump. Shipments of electromedical equipment



grew 15%, after discounting for inflation, in 1988 and again in 1989.

Still, even this robust industry is weakening. Commerce estimates shipments growth slowed to 8% in 1990 and will grow again around that rate in 1991. During the five-year period ending 1995, electromedical instruments shipment will grow at a relatively modest 6% annual rate.

—By Elizabeth B. Baatz

WORKSTATIONS

"Time to manage the database"

COMPETITORS HAVE always said that Sun Microsystems Inc.'s sales strategy is full of holes. This time they may be right.

Dunkin' Donuts Inc. of Randolph, Mass., is using Sun's new entry-level SparcStation ELC workstation to manage its Oracle database running on a SparcServer 490 fileserver—hardly a piece of cake for a company which this year is expected to sell one billion doughnuts in 44 states and 16 countries and adds 200 franchises every year. MIS director Dave Bennett says that Dunkin' Donuts chose the ELC over PCs because of the workstation's horsepower and multitasking capability.

Sun's effort to push sales of its workstations beyond the scientific/engineering arena into commercial applications is now reaching such wide-ranging markets as health care, education, airlines, and, of course, doughnuts.

Sun also reports that it has sold SparcStation ELCs to Healthcare Affiliated Services of Pittsburgh for maintaining patient records; to Yale University for use by faculty and students; and to Northwest Airlines for tracking ticket sales. Overall, commercial applications now account for about 30% of Sun's sales. And because the SparcStation ELC's entry price is below $5,000, Sun is counting on the new workstation to boost its sales into commercial markets.

—By Rick Whiting

INTERNATIONAL

New study rates European nations as business sites

WHEN IT COMES time to set up shop in Europe, U.S. executives have traditionally set their sights on English-speaking or highly industrialized regions. A recent study concludes, though, that Italy, Spain, Greece, and Portugal are also attractive sites.

The central part of Spain, for instance, has "a large, educated work force with a high level of growth and productivity," according to New York-based Ernst & Young, which rates 64 European regions on labor, transportation, taxation, financial incentives, and other variables.

"Each company has its own requirements for a headquarters, assembly plant, or distribution center," says Jim Searing, E&Y's director of international business services. But while electronics companies are attracted to France, Germany, and the U.K., he says, those seeking to set up a European site should look farther afield. Certain regions, he notes, offer cash incentives to companies that locate in their vicinity. But those incentives often aren't free. Some regions link them to the number of jobs created. The European Commission, moreover, may want to limit such incentives in certain areas.

Ireland features low taxes and few labor disputes, making it attractive for manufacturing and assembly. The country's high unemployment rate makes for a motivated work force and low wages. Major drawback: security.

Northern Italy is cited for high-tech manufacturing expertise. Regions south of Rome get high marks for low taxes and labor costs and high government incentives. But layoffs are expensive: They must be negotiated with the government and employees are paid until a settlement is reached.

E&Y cites a plentiful supply of low-priced labor in Spain, low property costs, and generous financial incentives. Seville and northern Spain are highly rated as manufacturing sites.

Belgium, the Netherlands, and Luxembourg rate highly for central location, good transportation, and low property costs. Brussels is cited for its service sector organizations and, with the Netherlands, as a site for R&D and distribution.

Scotland's Silicon Glen serves as a manufacturing site for chips, computers, and PCBs. Scotland also boasts 200 software companies and one of the world's top AI research centers. Scotland's location on the U.K.'s periphery makes distribution a challenge, although the Scottish Development Agency and industry are working to rectify that.

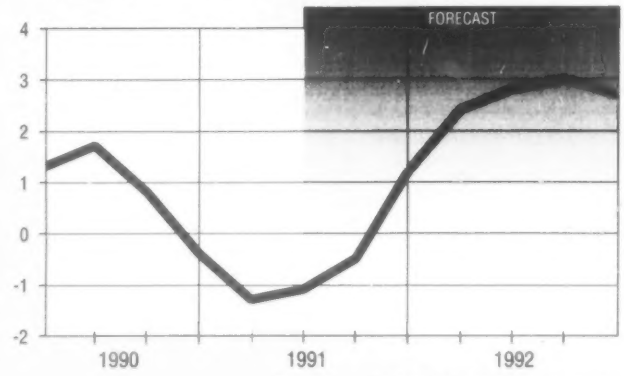
Sometimes the final decision has little to do with quantitative measures. One U.S. exec chose Belgium for his company's headquarters, even though his advisers had pushed for London. The executive and his wife wanted to bring their two cats, and Britain requires a six-month quarantine on imported animals.

For more information on the E&Y study, call (212) 773-6555.

—By Barbara Jorgensen

When consumers' wallets get a bit fatter...

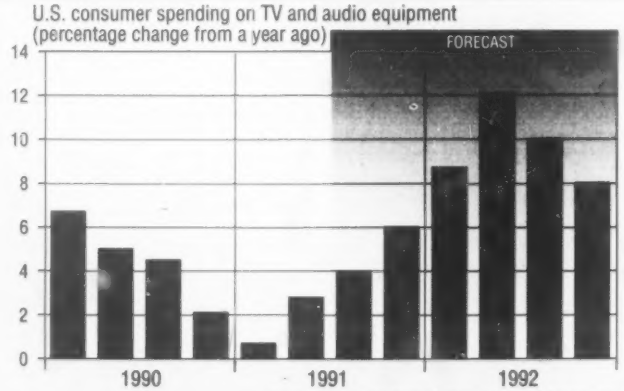
Disposable personal income (percentage change from a year ago)



Source: Commerce Dept., forecast: Cahners Economics

...consumers will buy more home electronics...

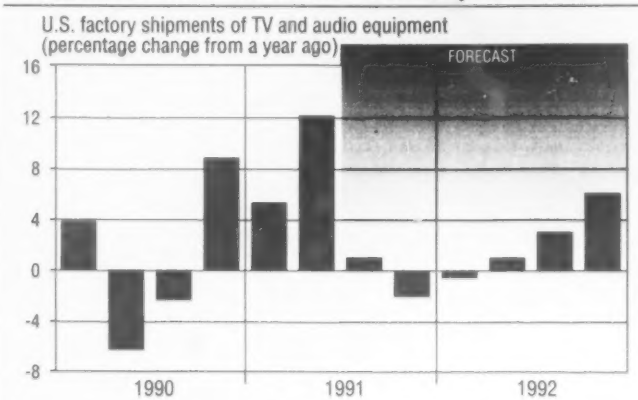
U.S. consumer spending on TV and audio equipment (percentage change from a year ago)



Source: Commerce Dept.; forecast: Cahners Economics

...but U.S. manufacturers don't expect a boom

U.S. factory shipments of TV and audio equipment (percentage change from a year ago)



Source: Commerce Dept.; forecast: Cahners Economics

Consumer electronics still feels the pinch

ALTHOUGH CONSUMER electronics sales showed surprising strength during the recession relative to other consumer markets, manufacturers and importers are still pinched by the nation's economic slowdown. Shipments of household audio and video products by U.S. manufacturers fared well in the first quarter of this year, climbing 5.3% over year-ago levels to $2.24 billion. Shipments hit $2.45 billion during the second quarter, a rise of 12.1% from the year-ago level.

Manufacturers looking for a rebound in the coming months will be disappointed, however. The nation's unemployment rate climbed from 5.2% in June 1990 to 7% in June 1991 and will remain high until the nation's production rate begins to expand more vigorously. As a result, disposable personal income has suffered since the second quarter of 1990. That, combined with a high rate of personal debt, will inevitably cut into the growth potential of consumer electronic sales.

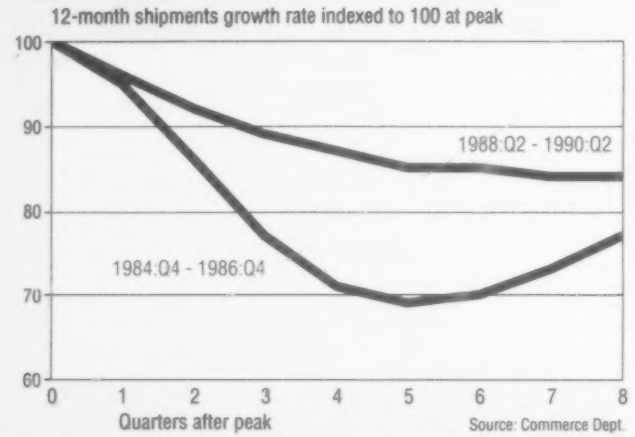
While U.S. makers of audio and video equipment saw sales rise, total U.S. consumer electronics spending advanced only 4.5% in 1990, the lowest one-year gain since 1980. Spending rose just 0.7% in the first quarter and 2.8% in the second quarter of 1991 compared with the same periods of 1990.

Cahners Economics' forecast for consumer spending on audio and video equipment calls for a mild 3.1% increase in 1991 before recording a healthier gain of 10% in 1992. Sales of domestically produced consumer electronics are expected to slow to 3.9% in 1991 and 2.4% in 1992.

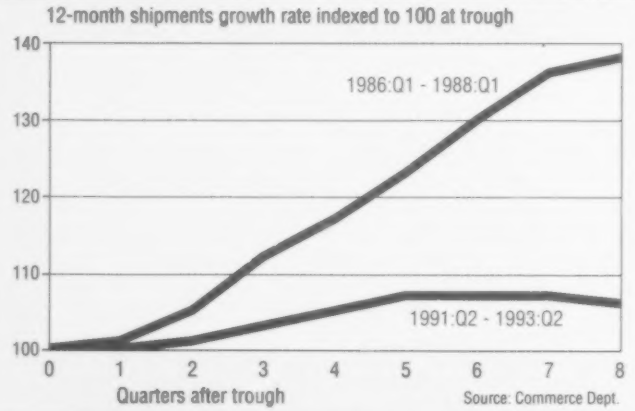
—by John Farrell

For more information on Cahners Economics' forecasts, write Dan Buchan at 275 Washington St., Newton, MA 02158; call (617) 630-2105; or fax (617) 630-2100.

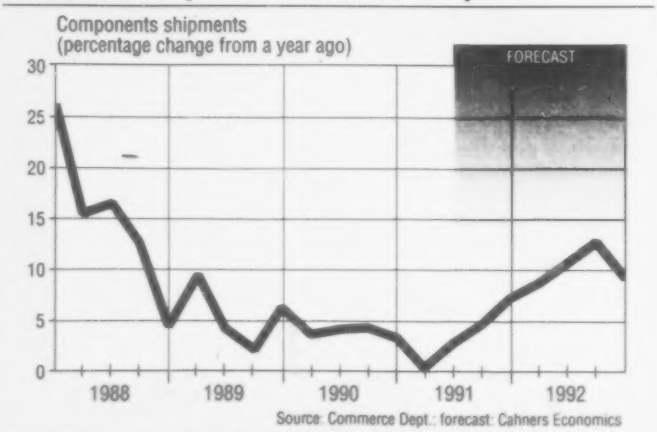
This components recession was milder...



...and the coming recovery will be more muted...



...so don't expect to match the '88 pace



Component shipments grow ever so slowly

AFTER THREE YEARS of weakening sales growth, electronic component manufacturers finally got some relief this past spring. U.S. factories shipped $15.9 billion worth of active, passive, and electromechanical devices in the second quarter of 1991, a 3.7% increase above the first quarter and 2.6% higher than a year ago.

As expected, this recession has remained much milder than the 1986 slump, when electronic component shipments fell 11.5% during the 12 months ended March 1986 compared with the previous 12-month period. This time around, shipments squeaked out a 2.5% growth for the 12 months ended June 1991—what now appears as the business-cycle low for this recession.

A milder slowdown this time will translate into a more moderate rebound in 1992. During the last expansionary period of 1987 to 1988, component shipments growth climbed to a peak rate of 23.5% in the 12 months ended May 1988. Shipments growth this time is expected to peak in the fourth quarter of 1992 but will top off at a growth rate of just 10%.

One reason the current recovery will be more muted than in previous years is better inventory control. Prior to the 1985 slowdown, manufacturers kept nearly 2.5 months of inventory on hand. In the current downturn beginning 1989 component factories stocked only 1.9 months of inventories.

With the slowdown finally over, manufacturers are now gearing up for the recovery. While some companies will feel the recession's effects longer than others due to international competitiveness, different product lines, and geographic location, the industry as a whole is expected to see demand rise in every quarter this year and next.

—By Julie Handelman

The buyer's guide to market research

Defining your forecasting needs will help you decide how and where to buy research and how to get your money's worth

By Elizabeth B. Baatz

If you remember the electronics euphoria of 1984, then you also remember how the bubble burst in 1985. Why didn't any of the high-powered, high-priced market researchers kicking around at the time warn us?

The honest answer is that few, if any, of the supposed soothsayers saw the crash coming. Despite what the market forecasters themselves tell you, in fact, predicting the future of electronics markets isn't a science at all, and most forecasts are just as likely to be wrong as right.

So why do so many companies continue to buy them? Why are there so many different types of market research firms? How do they differ from each other? How do you know which one best meets your specific needs? And what should you know about research methods and questionable practices *before* signing the check?

To be fair, much of the research community's bad rap is due to the very nature of forecasting the growth of new technologies. Since there often is little historical data on these technologies, there is no reliable statistical model that can be used to predict their futures. Forecasts for high-definition television, for example, depend on so many assumptions—on pricing, technical standards, the rate of user acceptance, etc.—that any market forecast is risky.

New technologies also are tough to call because no one can even agree on how to define emerging markets. In the late 1970s, for example, estimates of the ASIC market ranged from as low as $100 million to as high as $2 billion. The huge difference was due to definitions—in the former estimate, only gate arrays were included.

Even forecasts for older, slower-changing market segments (PCs, for example) are more likely to be wrong now than 10 years ago. The reason is that demand for many of those products was at one time powerful enough to override economic trends and other mitigating factors, and a straight-line forecast based on early market performance could be reasonably accurate. Now that the industry is more mature and more closely tied to the overall economy, such forecasts are less accurate.

Market forecast data can be wrong for other reasons too. Some buyers of market research contribute to the problem by forming close relationships with just one market researcher to whom the company then pitches its wares. Little wonder that one hears complaints when the researcher fails to deliver objective market data. In other cases, buyers deliberately or inadvertently promote unreliable data by expressing less interest in obtaining accurate numbers than in acquiring a favorable forecast to convince Wall Street that a company is in the right market. In such cases, research firms simply serve as "cheerleaders" by producing overly optimistic reports.

Occasionally, the tricks of the consultants' trade border on the unethical. One such gimmick is "double-dipping"—conducting a proprietary custom research project for one client and then selling it elsewhere. Another is to take an old report, tinker with it, and re-issue it as a new study—a common practice during the final troubled years of the now-defunct Gnostic Concepts.

BUYERS OF MARKET research also may be confused by the shopping-center variety of suppliers, each of which fills different market needs. Some are like K Marts, offer-

ing noncustom reports for $500 to $1,000 each. These reports are often written by ghost researchers, which means the quality of their reports could be questionable. In fact, magazines such as ELECTRONIC BUSINESS frequently receive calls from these researchers looking for information.

These researchers, however, are actually more like publishers of data. Their forecasts are often too optimistic and should be used carefully. Remember that good news sells reports, and the job of a publisher of research is to sell as many reports as possible. But if you merely need an overview of a market, these noncustom reports—available from New York-based Frost & Sullivan, for example, or San Jose-based Market Intelligence Research Co.—are often reliable enough for your purposes and may be less expensive than doing the research yourself.

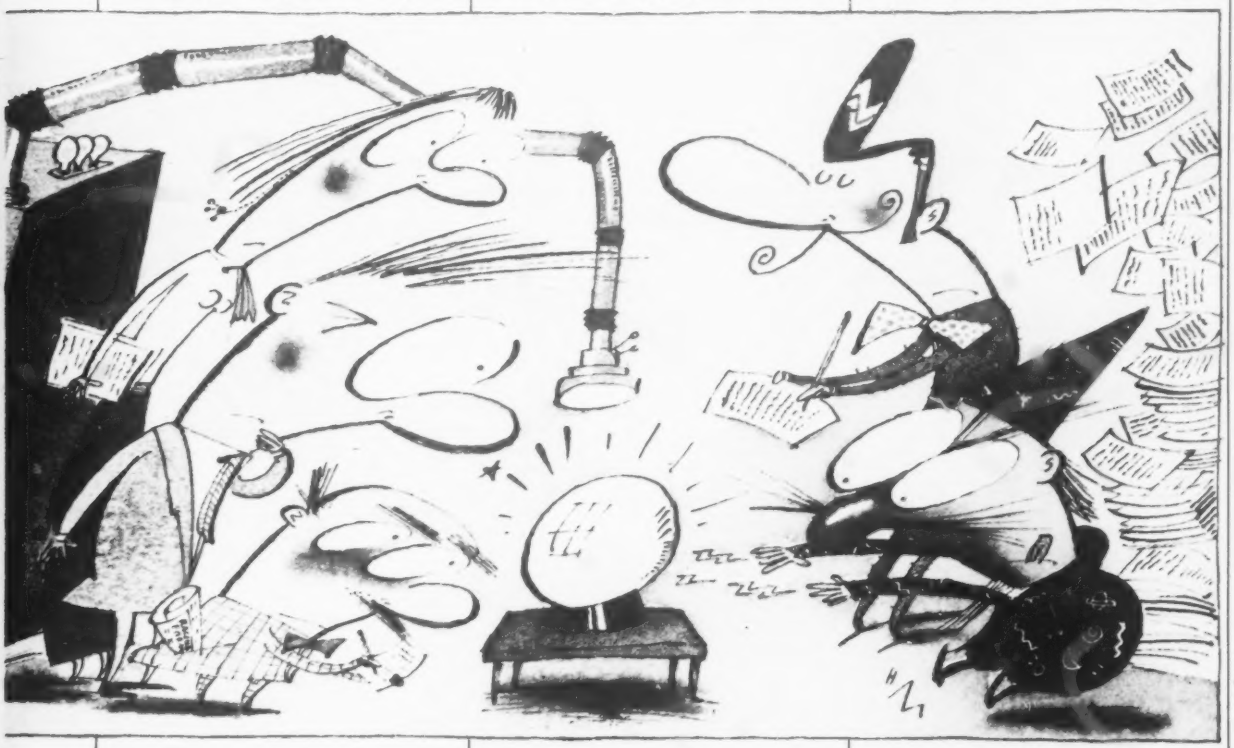
Other companies, such as Dataquest in San Jose and International Data Corp. (IDC) in Framingham, Mass., can be compared to Sears. They too offer a variety of studies, but they are compiled mostly by in-house analysts, and the quality is generally higher than the "K Mart" offerings. The forecasting service, often sold as a subscription, also is more expensive—$10,000 to $50,000.

Research firms sometimes serve as "cheerleaders" by producing overly optimistic reports

Large management consulting and accounting firms that do not specialize solely in computers or high-technology, such as Arthur D. Little and The Boston Group, charge big bucks for custom studies. Some companies—Dataquest, InfoCorp., and IDC, for example—specialize in generating numbers; others—Arthur D. Little, Medigroup, and the Gartner Group—are especially strong in market analysis and strategy. "The Gartner Group is a strategy company; I would never use their numbers," says Shari Morwood, senior market research consultant at Hewlett-Packard Co. "They make up their numbers based on their experience and things they've read."

Lastly are the specialty shops that focus on a particular market—VLSI Research for semiconductor equipment, Rose Associates for electronic materials, Stanford Resources for displays, Prime Data for instruments—and the less expensive, less well-known "mom 'n pop" shops. Of sometimes questionable quality, these latter companies are especially plentiful during recessions, when market research departments have been cut and an analyst with 25 years' experience sets up shop with a bundle of contacts.

To help sort out the differences between the various researchers, some



Hal Mayforth

Do-it-yourself forecasting

ONE OF THE MOST interesting trends in producing more accurate market research for electronics and computer industries is the use of new software that uses the industry's own information-processing power. One example is provided by John Crosby, formerly in charge of semiconductor operations for Western Digital and now president of Forecast Systems Inc. of Prescott, Ariz. For years, says Crosby, he dealt with "ill-conceived, ill-designed top-down forecasts," in which a company's forecast is driven by macroeconomic variables.

Noting the trend in the electronics industry toward partnering and strategic alliances between suppliers and customers, Crosby's software allows users to forecast their companies' needs based on data and forecasts from their suppliers and customers. Merged with existing top-down forecasts, such software offers industry executives an alternative to traditional market forecast data.

Companies with a strong command of their markets can even become sources for market researchers. "We've been the closest to the technology in our industry [robotic applications]," says Denise Dillon Harris, manager of marketing services at Precision Robots Inc. in Billerica, Mass. "So Dataquest has actually been calling us to learn about the market." □

larger electronics companies have allocated staff resources for evaluating, negotiating, and buying market research. Every year, for example, Hewlett-Packard publishes its internal *Guide to Syndicated Market Research*, which profiles and ranks the top 100 researchers. The providers are ranked on 60 different dimensions, says Morwood, including cost, accuracy, timeliness, methodology, and ethics.

WITH SO MANY TYPES of research firms to decide among, how do you make the right choice? The answer: Ask lots of questions. Users and market researchers alike note that the most important question is, What do you want to do with the research? Once you know your objective, you can narrow your choices.

Next, you should determine what the research is worth to you. "There are a lot of bright, presentable, witty people in this industry," says IDC senior vice president Aaron C. Goldberg. "If you want to buy interesting chat from a person, then buy it, but pay accordingly. The idea that someone can get $5,000 to $8,000 for an afternoon's work is ridiculous." If the fee is too steep, see if you can negotiate a customized subset of the subscription. That way, instead of paying $30,000 for the entire service, you pay only $10,000 for the part you really want.

Ask for references. Check out the experiences of other companies in your market. While a high-priced researcher in no way guarantees quality, going for bargains can also be a mistake. "Buying research is like buying attorneys or any other service," advises management consultant Tom Burke of Wayland, Mass., himself a frequent user of research. "If you don't appreciate the extra dimension that a researcher brings to a project, then you may mistakenly go for the lowest price."

If you want to buy interesting chat from a person, then buy it; but pay accordingly

Ask for forecast track records and examine them carefully. Track records can be jury-rigged. Check to make sure the date of the original forecast has been noted; you want a track record that shows what the forecaster said *before* the data was tallied. "Every analyst out there has been right at some time and they will advertise it," warns Michael Gimball, director of market research for Harris Semiconductor Corp. Gimball keeps his own records of the forecasters' accuracy over time.

Finally, ask for a good explanation of the research methodology. If it seems like smoke and mirrors or if the methods are "top secret," search elsewhere. "The guy who has a secret model that he won't release to the world is a quack," says Dan Hutcheson, president of VLSI Research in San Jose. "There are no secret models. What is proprietary is the forecaster's intelligence in using the models."

ONE COMMON PROBLEM in buying market research comes from knowing who you really are buying from. Top consulting companies such as Dataquest, IDC, and the big accounting firms admit to using subcontractors to help prepare some studies. "The large electronics companies [that buy the studies] like the big name and comfort of the large, well-known consulting companies," says independent consultant Phil Lapin, a printed circuit board specialist in Florence, Ore., who has worked for several major U.S. consulting firms that lacked resident staff experts. The research companies themselves insist that the use of outside contractors in no way compromises their quality standards, and sometimes that's true.

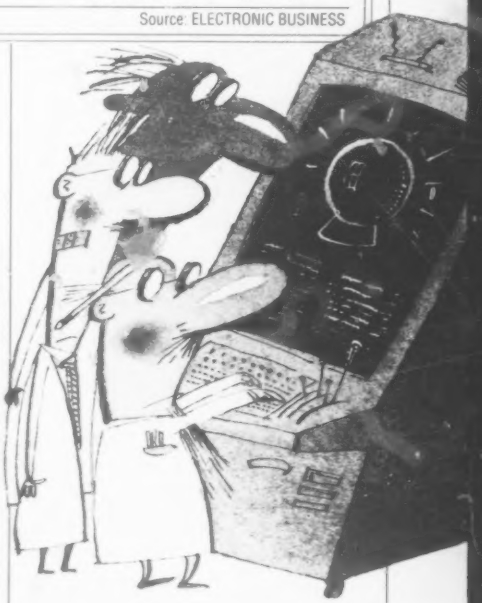
But clients that fail to ask whether the relevant expert is a full-time staff member or a subcontractor may miss an opportunity to hitch up with a less expensive, and perhaps just as reliable, independent researcher for future work. The savings can be considerable. In most cases, large

Forecasts reported by ELECTRONIC BUSINESS ... and how they did

Research company	Issue date	Market	1990 Forecast	1990 Actual
Integrated [illegible] Engineering	7/1/85	Worldwide gate array market	$2.2 billion	$3.5 billion
Henderson Ventures	12/10/85	U.S. electronic equipment production	309.7 billion	218.3 billion
Electronic Industries Association	1/15/86	Electronic content for U.S. DOD budget	56.5 billion	55.3 billion
Probe Research Group	5/15/86	U.S. voice messaging market	840.0 million	810.0 million
International Data Corp.	6/1/86	Worldwide T-1 multiplexer sales	562.4 million	670.0 million
Technology Research Group	10/7/87	Worldwide CAE market	2.5 billion	1.6 billion
Stanford Resources Inc.	11/15/87	Worldwide flat panel display sales	2.9 billion	3.2 billion

Source: ELECTRONIC BUSINESS

Tracking down the actual 1990 data for markets that were forecast three or more years ago was no easy task, but here's a random look at some forecasts we published years ago and how they actually did. In order to avoid definitional problems, forecasts are compared with actual data released by the original source. Frost & Sullivan and Dataquest, two forecasters that appear frequently in the pages of ELECTRONIC BUSINESS, were unable to provide us with comparable data



Research buyers set control

ABOUT A [illegible]R and a half ago, research [illegible] from major computer and semiconductor companies moved to improve the quality of computer-industry data by forming the Computer Market Analysis Group (CMAG). Members hoped that by demanding standardized definitions for market segments, geography, and distribution channels, the research providers would respond with better data. Membership in the group, which is open to any company that sells or makes computers, has grown by word of mouth and now includes IBM, Apple [illegible]mputer, Hewlett-Packard, [illegible]gital Equipment, Sun Microsystems, and Intel, among others.

One of the group's first tasks was to survey the methodologies of major research vendors. When the survey yielded murky answers, CMAG started inviting researchers to their meetings to personally describe their processes. While some researchers sweat bullets at these presentations, the response of the data providers has been "very good," says John Hagens of International Planning and Research Inc. in Philadelphia, the management consulting company that facilitated CMAG.

"The honesty has been amazing," says one CMAG member, who recalled that during one such meeting a researcher admitted in front of the group that he got market share data by inviting product managers out for cocktails at the trade shows and taking notes on the back of a napkin.

Other developments in the industry include the formation of the World Microprocessor Statistics Committee, which is modeled after the chip industry's World Semiconductor Trade Statistics program. Once the program is in full swing, the computer industry will finally become more sophisticated in its own data collection efforts by exchanging sales statistics. □

consulting firms that use outside talent for a study charge the buyer at least three times what they pay the subcontractor.

None of this implies that market-research companies are an endangered species. Most observers concede that at least some of the complaints about the forecasters are a simple case of killing the messenger. Perhaps the most important point is that it's the buyer's responsibility to minimize the chances of getting burned by knowing precisely what he or she needs and what it's really worth. In that sense, buying market data is basically no different from buying anything else. □

Japan's top 50 electronic companies escape recession

Japanese sales spurted 19% last year, nearly three times the rate of U.S. electronics companies

By Paula Doe

JUDGING FROM sales by Japan's biggest electronics companies, it's hard to believe there was a recession or a semiconductor slump last year. The 20 top Japanese electronics companies increased their total electronics sales (expressed in yen) by a whopping 19% in fiscal 1990; the yen's appreciation during the year added another 12% to the dollar value, bringing the companies' electronics sales to $203 billion. By contrast, the top 20 U.S. electronics companies managed to grow their electronics sales by only 7% to reach $199 billion.

Surprisingly, the big growth in Japan didn't come from the giants with the most sophisticated technology in semiconductors and computers. It came largely from companies that continued to make incremental improvements on mundane products such as automotive controls, copiers, and consumer electronics.

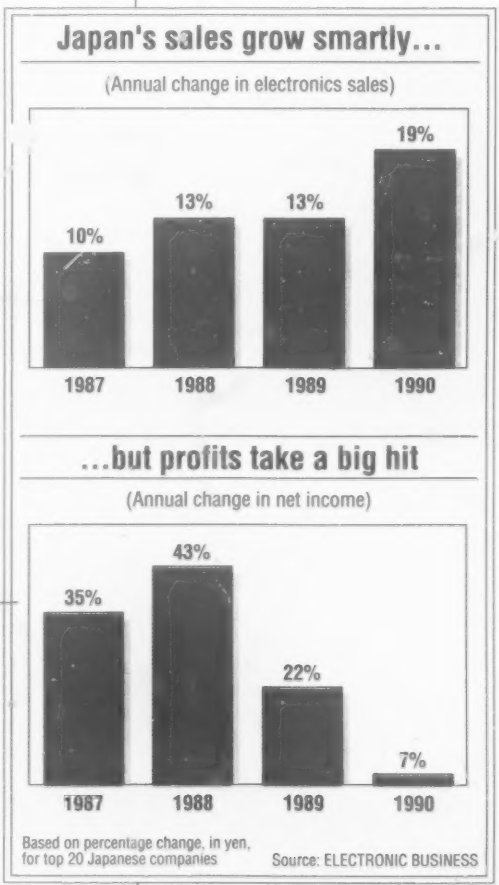
The hot growth electronics company of the year, for example, was automotive components maker Nippondenso Co., best known as a producer of car heaters and air conditioners. The company increased its yen-based sales of electronics products by 32%, to the equivalent of $3.3 billion. Most of the growth came from soaring sales of electronic fuel-injection systems to its affiliate Toyota Motor Corp. But the company is also doing well in bar code scanners.

Copier makers Canon Inc. and Ricoh Co. also posted strong sales, increasing their electronics revenues by 28% and 2 %, respectively. In both cases, growth is being driven by booming sales of color and digital copiers. But copiers are just one example of highly successful improvements on old products coming out of these companies. Canon is also doing well with innovations ranging from bubble jet printers to faster auto-focus cameras. Citizen Watch Co. managed to boost revenue by 26% with higher sales of information equipment.

Sony Corp. is yet another company that is flying high on consumer electronics, increasing its electronics revenue by 24%. While Sony's sales of components and information equipment grew the fastest (29%), revenue also climbed by more than 20% in its main audio, video, and television businesses.

Overall, the Japanese electronics companies did better than the rest of the Japanese manufacturers. Altogether, the latter segment increased sales 11% in fiscal 1990, according to a recent survey by *Nihon Keizai Shimbun*. Pretax profits dropped 4%, while net income remained unchanged.

But Japanese electronics didn't escape the recession entirely unscathed. While most of the companies with the biggest sales gains also



saw healthy profit increases, overall profit growth slowed. Net income at the top 20 Japanese electronics companies rose by only 7%, compared with a 22% growth the year before and a 26% growth by the U.S. top 20 in fiscal 1990.

THERE WERE SEVERAL reasons for that relatively sluggish performance. One was the slow economy in the United States and elsewhere, which cut demand for exports by some Japanese companies. Some earnings were trimmed by the big depreciation expenses associated with aggressive capital investment in recent years, and the slowdown of Japan's once-booming financial markets also hurt performance, as sharply lower stock prices and interest rates cut the companies' windfall investment and interest income that had been propping up their profits.

Indeed, about one-third of the 50 Japanese companies that had $800 million or more in electronics sales in fiscal 1990 saw profits actually decline, in some cases at a double-digit rate. Big names such as NEC Corp., Sanyo Electric Co., Oki Electric Industry Co., Minolta Camera Co., Konica Corp., and Shimadzu Corp. saw pretax profits drop 20% or more. In fact, industry giant NEC's net income dropped 36% from the year before, slipping to less than 2% of total revenue. The company took losses initially because it withdrew from the audio-visual business in the United States, and then it was further hurt by slumping prices for memory chips and lower earnings from affiliates.

Still, total operating income remained at about 7% of total revenues for the top 20 Japanese electronics companies, and some companies managed to maintain their fat margins. Nintendo Co. and Fanuc Ltd. raked in operating income of roughly 29% of total sales. Component makers also did well. Capacitor maker Murata Manufacturing Co. managed operating margins of 16% of sales, TDK Corp. had 13%, and Kyocera Corp. had 12%.

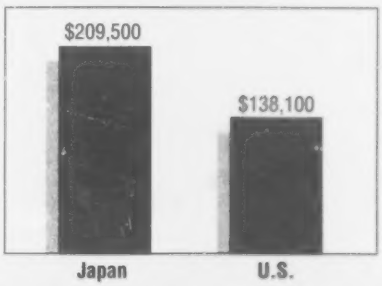
The United States continued to chip away at Japan's traditional productivity advantage. Sales per employee at the top 20 Japanese electronics companies inched up only 3% in fiscal 1990, versus 11% growth at the top 20 U.S. companies.

Why the relatively low productivity gain in Japan despite the higher sales? The main reason is that Japanese companies added so many new workers: Employment at the top 20 climbed 10%, to about 1.2 million. The gains in the United States came from cutting back personnel by about 4% (to approximately 1.5 million) while boosting sales by 7%.

ALL OF THE DATA suggests that U.S. productivity remains only about two-thirds the Japanese level. Sales per employee at the top 20 U.S. electronics companies came to $138,100, compared with $209,500 at their Japanese counterparts. The actual difference is probably somewhat less, however, since Japanese sales in dollars got a boost from the exchange rate and the Japanese data included workers at affiliates that don't show up in consolidated totals. □

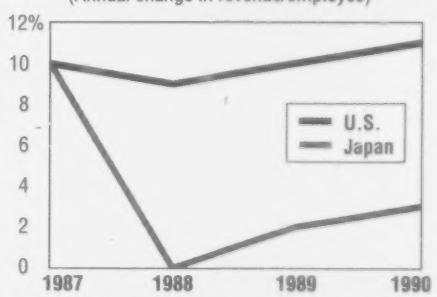
Japan is tops in productivity...

(Average revenue/employee, 1990)



...but U.S. is improving faster

(Annual change in revenue/employee)



Based on data from top 20 electronics companies

Source: ELECTRONIC BUSINESS

Japanese vs. U.S. electronics companies in 1990

	Japanese top 20	% change from 1989	U.S. top 20	% change from 1989
Electronics sales ($ billions)	$203.2	+19	$198.8	+7
Total sales ($ billions)	$252.2	+13	$203.6	+6
Net income ($ billions)	$7.7	+7	$12.0	+26
Net income/revenue	3.0%		6.0%	
Sales/employee	$209,500	+3	$138,100	+11
Net income/employee	$6,400	-2	$8,200	+32

Exchange rate: 141 yen=$1

Source: ELECTRONIC BUSINESS

TOP 50 JAPANESE COMPANIES

1991 Rank	1990 Rank	Company	Electronics sales ($ millions)	% change '91/'90	Total sales ($ millions)	% change '91/'90	Operating income ($ millions)
1	1	Matsushita[1]	$33,389	9	$46,804	10	$3,352
2	2	NEC	26,233	7	26,233	7	1,522
3	3	Toshiba	25,100	17	33,301	10	1,859
4	4	Hitachi	22,900	14	54,872	9	3,592
5	5	Fujitsu[2]	21,074	17	21,074	17	1,386
6	6	Sony	20,461	24	26,176	25	2,110
7	7	NTT[2]	15,000	NA	44,337	4	4,421
8	9	Canon	12,000	28	12,255	28	1,126
9	8	Mitsubishi	11,800	11	23,519	11	1,481
10	10	Sharp[2]	9,000	13	10,869	12	539
11	12	Ricoh	6,200	26	7,115	20	248
12	11	Sanyo	5,331	7	10,611	8	345
13	13	Oki[2]	4,687	5	4,687	5	209
14	14	Pioneer	4,253	15	4,253	15	513
15	15	TDK	3,830	13	3,830	13	483
16	22	Nintendo	3,343	NM	3,343	96	978
17	17	Alps[2]	3,278	15	3,278	15	169
18	19	Nippondenso[2]	3,254	32	10,721	16	771
19	16	Omron	3,250	12	3,293	12	324
20	—	Toyota[2]	2,900	5	65,197	15	4,560
21	18	Kyocera	2,754	6	3,271	10	394
22	23	Citizen[2]	2,600	26	2,902	22	258
23	—	Fuji Electric[2]	2,400	12	5,945	9	291
24	21	Casio[2]	2,378	10	2,378	10	132
25	24	Minolta[2,3]	2,300	20	2,600	7	50
26	20	Seiko[2,4]	2,300	1	3,035	1	163
27	27	Matsushita Electric Works[2]	2,000	23	7,317	16	592
28	25	Murata	1,967	12	1,967	12	318
29	28	Nikon[2]	1,700	6	2,165	7	248
30	26	Yokogawa[2,3]	1,700	5	1,800	5	100
31	—	Nissan[2]	1,700	2	42,304	6	893
32	32	Kenwood[2]	1,564	19	1,564	NM	56
33	—	Konica[2,3]	1,500	4	3,750	4	200
34	29	Ryosan[2]	1,497	1	1,497	1	41
35	30	Japan Radio[2]	1,466	8	1,466	8	125
36	34	Yamaha[2]	1,400	11	3,611	2	120
37	35	Olympus	1,400	14	1,758	13	177
38	36	TEL[2]	1,349	10	1,349	10	146
39	31	Fanuc[2,3]	1,300	5	1,300	5	400
40	—	Honda	1,300	-1	30,507	12	1,041
41	37	Rohm[2,3]	1,300	8	1,300	8	100
42	38	Clarion[2]	1,300	17	1,316	17	54
43	33	Shimadzu[2]	1,200	9	1,359	7	82
44	39	Shin-Etsu Chemical[2,3]	1,200	13	3,200	6	350
45	40	Mitsumi[2]	1,125	13	1,125	13	46
46	41	Sanshin Electronics[2]	1,045	7	1,045	7	25
47	46	TEAC[2,3]	903	15	903	15	61
48	44	Kokusai[2,3]	900	16	900	16	80
49	43	Ryoyo Electro[2]	875	2	875	2	42
50	45	Sanken Electric[2,3]	875	13	875	13	50

NA = Not available NM = Not meaningful because of change of fiscal year

Yen converted at March 1991 fiscal year-end rate of 141 Yen to $1. Those companies whose fiscal year ended at other times used different rates in their own reporting

[1]Includes sales of consolidated subsidiary JVC

[2]Consolidation by Japanese accounting rules, which differ slightly from U.S. Securities and Exchange Commission rules

[3]Preliminary estimates before release of final consolidated results

TOP 50 JAPANESE COMPANIES

% change '91/'90	Operating income % sales	Pretax income ($ millions)	% change '91/'90	Net income ($ millions)	% change '91/'90	Net income % sales	Sales per employee	Net income employee	Fiscal year ended
4	7	$4,237	4	$1,836	10	4	$222,000	$8,700	3/91
-8	6	952	-23	386	-36	1	222,300	3,300	3/91
-17	6	1,836	-4	857	-8	3	205,600	5,300	3/91
1	7	3,986	6	1,633	9	3	177,100	5,300	3/91
13	7	1,055	-1	586	-5	3	144,500	4,000	3/91
1	8	1,877	16	829	14	3	231,800	7,300	3/91
-12	10	3,119	-14	1,674	-14	4	164,000[6]	6,200[6]	3/91
37	9	1,096	70	436	60	4	225,400	8,000	12/90
-8	6	1,297	1	566	4	2	242,500	5,800	3/91
-5	5	646	0	333	12	3	301,900	9,200	3/91
23	3	267	21	96	-15	1	192,300	2,600	3/91
7	3	252	-24	124	4	1	192,500	2,250	11/90
-16	4	160	-24	70	-40	1	234,400	3,500	3/91
NA	12	511	13	243	16	6	277,900	15,900	3/91
22	13	446	22	202	23	5	166,500	8,800	3/91
112	29	1,004	111	489	109	15	1,114,000	162,800	3/91
108	5	143	158	59	1,062	2	136,600	2,400	3/91
13	7	935	16	447	30	4	200,100	8,300	12/90
1	10	319[5]	3	152	3	5	195,600	9,000	3/91
37	7	5,942	34	3,130	27	5	821,200[6]	37,000[6]	6/90
-7	12	463	-9	229	-5	7	112,800	7,900	3/91
52	9	248[5]	48	121	77	4	145,100	6,100	3/91
7	5	251	6	157	59	3	312,300[6]	9,600[6]	3/91
8	6	141	28	65	22	3	317,900	8,700	3/91
-73	2	-15	-112	-15	-155	-1	259,500[6]	-4,300[6]	3/91
NA	5	42	NA	5	-64	0	189,700	300	3/91
18	8	521	15	236	5	3	417,100[6]	14,100[6]	11/90
26	16	366	24	178	32	9	98,400	8,900	3/91
-15	11	199[5]	-11	123	-8	6	252,300[6]	11,800[6]	3/91
19	6	140	12	70	-5	4	201,800[6]	9,600[6]	3/91
-64	2	513	-78	346	-58	1	520,600[6]	9,700[6]	3/91
NM	4	41	NM	16	NM	1	312,800	3,200	3/91
-5	5	90	-30	15	108	0	502,400[6]	11,000[6]	4/91
110	3	57	3	30	30	2	1,115,500[6]	22,300[6]	9/90
5	9	102	3	52	24	4	223,600	7,900	3/91
-11	3	96	-10	54	24	2	221,900[6]	2,300[6]	3/91
50	10	108	-14	52	-12	3	195,300	5,800	3/91
7	11	152	14	79	23	6	374,700	21,900	9/90
-3	31	500	6	250	9	19	641,400[6]	131,000[6]	3/91
-27	3	936	-13	541	-7	2	627,800[6]	10,500[6]	3/91
3	8	80	-15	40	-10	3	446,000[6]	11,900[6]	3/91
167	4	36	143	7	32	0	263,200	1,300	9/90
-18	6	85	-20	43	-17	3	279,700[6]	11,400[6]	3/91
-2	11	340	-1	180	-6	6	538,200[6]	23,800[6]	3/91
130	4	18	NM	11	NM	1	75,000	700	1/91
67	2	24	-5	10	-6	1	1,188,000[6]	12,900[6]	9/90
14	7	54	24	31	11	3	509,900[6]	11,000[6]	3/91
3	9	80	11	50	8	6	463,000[6]	22,600[6]	3/91
-5	5	46	7	22	8	3	1,239,300	31,300	1/91
3	6	40	-8	10	-33	1	436,200[6]	4,300[6]	3/91

[4]Sales of Seiko Corp. (formerly Hattori Seiko) only. Does not include sales of affiliates Seiko Epson and Seiko Instruments, which are separate, privately held corporations. Seiko Epson sold roughly an additional $850 million through its own subsidiary Epson Sales; most of the rest of its approximately $3.3 billion output was sold to Seiko Corp.

[5]Estimate

[6]Figures for parent company only, which tend to be higher than consolidated figures

Source: ELECTRONIC BUSINESS

Catch-22 in the power supply market

Vendors want to standardize architectures, but the very nature of the market could make that all but impossible

By Dave Webb

Throughout the early to mid-1980s, technology in the U.S. merchant market for AC/DC power supplies moved along like a placid, slow-moving river.

Now the water is getting choppy for hundreds of merchant AC/DC power supply vendors. Increasing demand for so-called distributed switching power architectures and for more custom designs is growing in the largest market segments, such as computers and telecommunications. On the bright side, more systems manufacturers are reducing their in-house power supply production and turning to merchant market suppliers.

According to the New York market research firm Frost & Sullivan Inc., power supplies generated $5.6 billion in revenue for U.S. captive and merchant vendors in 1989. Of the two major technology segments—linear power supplies and switching power supplies—the newer switching supplies are now the dominant revenue generator.

Frost & Sullivan predicts that the combined captive and merchant market sales of linear supplies will fall from $2.1 billion in 1989 to $1.9 billion by 1995. Sales of switching supplies should rise from $3.5 billion in 1989 to $6.9 billion by 1995. The firm predicts the captive market will grow with the total market, but captive "sales" won't keep pace with the merchant market, where sales are expected to more than double by 1995.

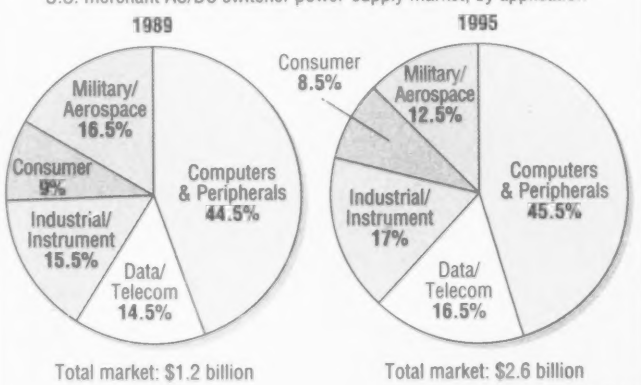
SINCE POWER SUPPLIES tend to be among the last components designed into products such as computers—which now represent the largest single market segment for power supplies—OEM manufacturers have long required some amount of customization to make the devices fit and work within their nearly completed systems. While many of the large OEM producers build their own power supplies, an army of merchant manufacturers (perhaps as many as 500) has sprung up.

Captive vendors are surrendering market share because power supply designs are growing more sophisticated and are "too large a burden" for them to deal with cost-effectively, says Andrew Boyer, Astec America Inc.'s product manager. "Of the very large U.S. and European markets, 60% of them [combined] is captive," says Boyer. "That's beginning to change. Captive vendors are starting to realize that the trade-offs aren't worth it."

This decline in dependence on captive manufacturing is likely to further encourage customization and discourage standardization. To the largest merchant vendors—such as Astec, Computer Products/Power Conversion America, Lambda Electronics Inc., and Vicor Corp.—this is bad news. These companies want less customization and more standardization to achieve the economies of scale associated with volume manufacturing. Because of the higher technological demands on them and the rest of the merchant market, those same companies are better-positioned to meet OEM needs than most of the so-called garage shops

Breaking down the market

U.S. merchant AC/DC switcher power-supply market, by application



Source: Frost & Sullivan Inc.

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now plying the market.

"This is really a strange market," says Mohan Mankikar, president of Micro-Tech Consultants in Santa Rosa, Calif. "No one [merchant market] vendor dominates the market because there is so little true standardization."

With the large, formerly captive manufacturers turning to outside sources for power supplies, it seems logical that merchant vendors can begin to standardize on the designs required by those volume-order customers. Many think the large pool of small garage-shop vendors would dry up as standardization on volume orders will give winners of those large-volume orders economies of scale to cut pricing to the bone. Small hardware houses can't operate on the low-margin business spawned by such volume pricing.

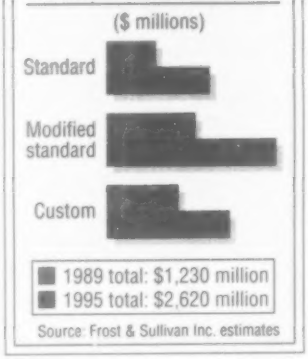
Unfortunately for those merchant vendors who would tackle volume markets, standardization isn't happening as quickly as they would like. And one of the biggest reasons OEMs are jettisoning internal power supply manufacturing is that with so many small merchant manufacturers willing to do custom designs, it is more cost-effective to let them do it.

"There's been a slow movement toward standardization, but it's sort of a Catch-22," says Connie Heath, a power component market analyst at the Natick, Mass.-based research firm Venture Development Corp. "[Vendors] want standardization, but the specifications dictated by customers never end up fitting a standard. You're starting out with standard modules which end up being configured on a customer-by-customer basis."

According to Frost & Sullivan, custom and so-called "modified standard" AC/DC switcher power supplies will account for $1.97 billion of the $2.62 billion in revenue it estimated would be generated in 1995.

"There's a wide array of vendors, but there just aren't a whole lot of standards," says Ken Blake, a product marketing manager with Computer Products Inc.'s Power Conversion America division. "Design cycles typically put power supplies at the end, therefore making it necessary to put in custom or 'non-standard' derivations of standard platforms to make them work."

The merchant switcher market: standard vs. custom



What makes both the Catch-22 standardization and the waning captive market so perilous is the rate of change in technology and innovation. "New technologies are available that are dramatically changing the whole power concept," says a product manager at Vicor Corp.

OEMs are demanding smaller and smaller power units while asking for higher power densities and efficiencies that cut down heat dissipation, says Irving Gutman, executive vice president of Lambda Electronics' North American operations. "The power supply has always lagged [technologically] behind everything," Gutman says.

The market for AC/DC switching power supplies is most commonly divided between computers and computer peripherals, communications, industrial systems and instrumentation, consumer electronics, and military/aerospace segments. The largest segment for U.S. vendors is the midrange power market (150 to 500 watts). Offshore vendors, mostly Asian, have firm control of the low-end, sub-150-watt market, while the market for units of more than 500 watts is dominated by U.S. vendors. □